

SPECIAL TOPIC

Next Generation Network Service Provision Mode and Its Developing Trend

Abstract:

The provision mode of the telecommunication service has experienced an evolving process, and showing the developing trend from distributed to centralized, from integrated to separated, and from closed to open. To suit this trend, there will be three provision modes as Session Initiation Protocol (SIP) server, Open Service Access (OSA) application server and intelligent network (IN) in Next Generation Network (NGN), provides all kinds of services and applications to the subscribers. With the popularity of broadband access and Internet, the NGN will provide single telecommunication service and act as the important national infrastructure to offer various information services to the subscribers. The service provision mode will be more open, diversified, and individualized.

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1 Service Provision Mode of the Telecommunication Network

The service provision mode of the telecommunication network has been evolving from the infrastructural network equipment to the local service platform, and to the Intelligent Network (IN) and the third party. This manifests a development trend from distributed to centralized, from integrated to separated, and from closed to open. The development trend of centralization, separation and openness causes the whole telecommunication network to separate and derive a service layer from the single call control plane, which accounts as a larger and larger proportion and becomes increasingly diversified.

(1) The Infrastructural Network Equipment Provision Mode

In the infrastructural network equipment mode, the service control is closely coupled with the call control, and the service control is completely

distributed on the network.

At the initial stage, the telecommunication network services are primarily voice services, which are provided by the infrastructural equipment. These devices are distributed in the network. That is the local office switch on Public Switched Telephone Network (PSTN)/Integrated Services Digital Network (ISDN), and the Mobile Switching Center (MSC)/Visitor Location Register (VLR) and Home Location Register (HLR) on Public Land Mobile Network (PLMN). They provide various basic services and supplementary services for users. In this mode, there are several characteristics as following.

- Services are completely distributed over the devices on the network.
- Any modification or development of services to be implemented synchronously in all switches on the entire network.
- The services provided by this mode are relatively simple.

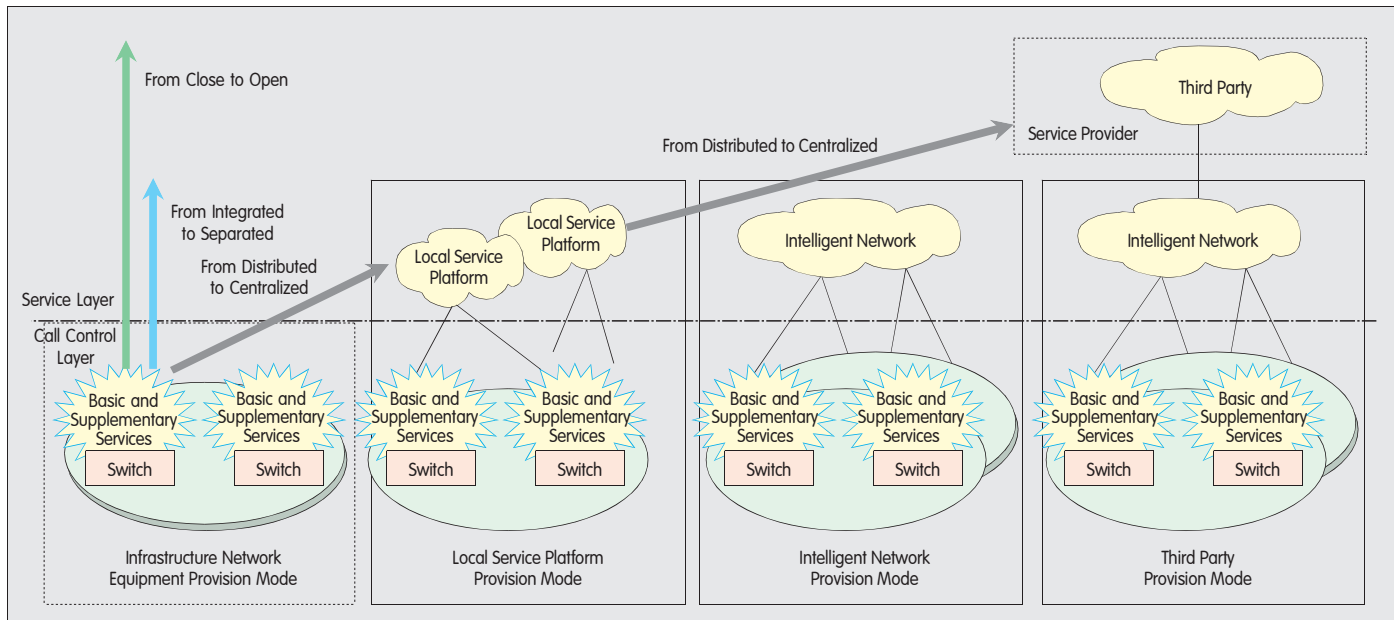
(2) The Local Service Platform Provision Mode

In the local service platform provision mode, the service control is loosely coupled with the call control, and is relatively centralized. The service data are also relatively centralized.

With the rising requirements of the service users, services are becoming increasingly complicated. The basic and supplementary services provided by the infrastructural network equipment can no longer satisfy the requirements of users, because the deployment of new services causing some major modification of the infrastructural network. Thus, the local service platform emerges, as time require.

In the case of there are not many users, who do not roam, a service platform can be constructed within a local network to provide services, such as 200–telephone card service. The switch will forward all 200 service calls to the 200–service platform, which will handle them. This mode has the following features:

- The platform performs the call connection and service control, and the control capability is limited.



▲ Figure 1. Development trends of service provision modes.

- Services are relatively centralized in the local service platform, overlapped on the infrastructural network, which is convenient for service handling.
- When a user roams to another place, different platforms need to be interconnected, which is available with a limited range of services.

(3) The Intelligent Network Provision Mode

In the intelligent network provision mode, the service control is separated from the call control, and is completely centralized. The service data are also completely centralized.

With the rising requirements of the service users for roaming and the increase of service traffic, IN are used widely on both mobile and fixed networks as a technology that can realize centralized service creation, service management and service control. Almost all telecommunication operators have constructed the IN network over the existing infrastructural network to provide card service, prepaid service, 800 service and Virtual Private Network (VPN) service.

In IN architecture, the service control and the service data are completely separated from the infrastructural network. The Service Control Point (SCP) is responsible for the centralized control of service logic; the Service Data Point (SDP) is responsible for the centralized

storage of service data; the Service Management Point (SMP) is responsible for the centralized configuration and management of services^[1].

As an important service provision mode, IN still plays very important role in the existing telecommunication network, and will still has its position during the network evolution from circuit switching to packet switching. It constitutes three important service provision modes of NGN together with the Session Initiation Protocol (SIP) server and Open Service Access (OSA) server^[2].

(4) The Third Party Provision Mode

In this mode, the service control is separated from the call control, and is completely centralized. The service data are also completely centralized. The service provider is completely separated from the network provider.

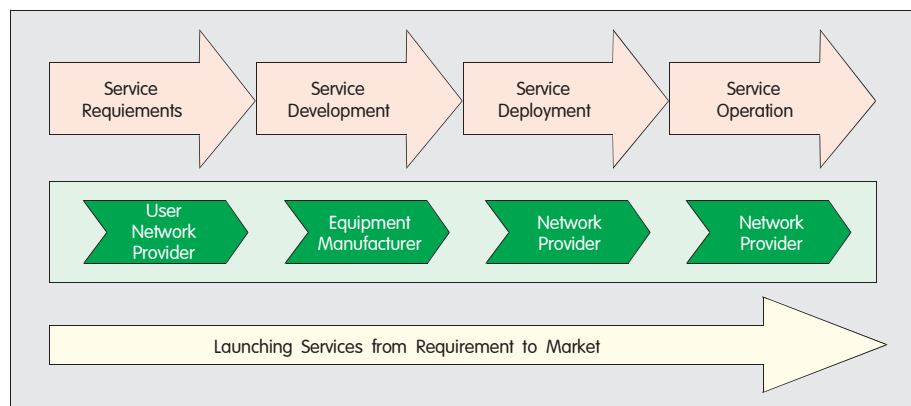
The service provision mode evolves from the infrastructural network equipment, the local service platform to IN, showing a development trend from distributed to centralized, and from integrated to separated, with a service layer derived from the telecommunication network. However, the services are still provided by the network provider, with a relatively limited number of service categories.

In order to provide more rich services to users, the telecommunication service provision mode is evolving towards the

third party mode, so as to make the most of the abundant service and content resources of the third party. This mode may appear in different ways, for example, by opening the third party interface^[3] via the Application Programming Interface (API) such as Parlay, the network operator can cooperate with the Internet Content Provider (ICP) to offer services such as colorful ring back tone, audible web page, and sending short messages via the Internet. This mode makes the most of the abundant network resources and user resources of the network carrier as well as the abundant service and content resources of the third party to provide users with rich services.

The development trend of the service provision mode from distributed to centralized, from integrated to separated, and from closed to open is shown in Figure 1.

Although the service provision shows a development trend from distributed to centralized, from integrated to separated, and from closed to open, the network provider has always been playing a vital role throughout the whole process. To provide a service, firstly the network operator submits the user's service requirement to the equipment manufacturer who will develop the service based on the requirement, then the subsequent service deployment and



▲ Figure 2. The service provision process.

operation will be done by the network provider. The service provision process is shown in Figure 2.

The development of services relies on the equipment manufacturer. Even if the network operator opens the third party service interface, the frame and main entity for providing services is still the network operator, causing the provision mode relatively closed. The services are primarily provided by the network operator. The user can customize his own service within the scope specified by the network operator, but the user is unable to act as the main entity of the service provision. A third party is also allowed to include service-specific content or information, such as ring tones and web pages. This involvement is limited in service providing and only within the architecture and scope defined by the network provider. This scenario is quite different from the service provision mode of the Internet, which allows everyone to be involved in service providing.

2 Development Trend of Service Provision Mode

From the existing standardization, it can be expected that three service provision modes^[4] will be available for NGN to provide various services and applications for users: the SIP server, the OSA application server and the IN as shown in Figure 3.

The long-term perspective is that NGN will no longer offer single telecommunication service, but will present an integrated information service environment. With the popularity of the

broadband access and Internet, NGN will serve as an important national infrastructure to provide various information services for users.

The NGN will be a harmonious communication system, which inherits the profitable and manageable service provision mode of the telecommunication network and incorporates the flexible and open features of Internet. The service provision of NGN will have the following development tendency.

2.1 The Value Chain is Extending, Subdividing and Opening

The value chain of NGN will be

continuously extended, subdivided and opened. It will develop from a chain type to "Mesh" type, and a variety of roles involve in providing services. Service providing will be more open and integrated, and form a cooperative, win-win, prosperous, orderly, and healthy NGN ecosystem. It will be a harmonious communication society, with services available everywhere.

The feature of separation of NGN services and network will result in the change of service provision mode. It is impossible for only one enterprise to develop, deploy, and provide all future services. The service provision will be more open and flexible, and the time to market it will be shortened, with stronger adaptability to the market. Various roles such as the service subscriber, the network operator, the service/application provider, the content provider, the service agent, the service wholesaler, and the Internet service provider can all be involved in service providing and marketing.

Any service subscriber can customize his individualized services. Network providers provide secure and reliable communication network infrastructures for services. Various service/application providers can give

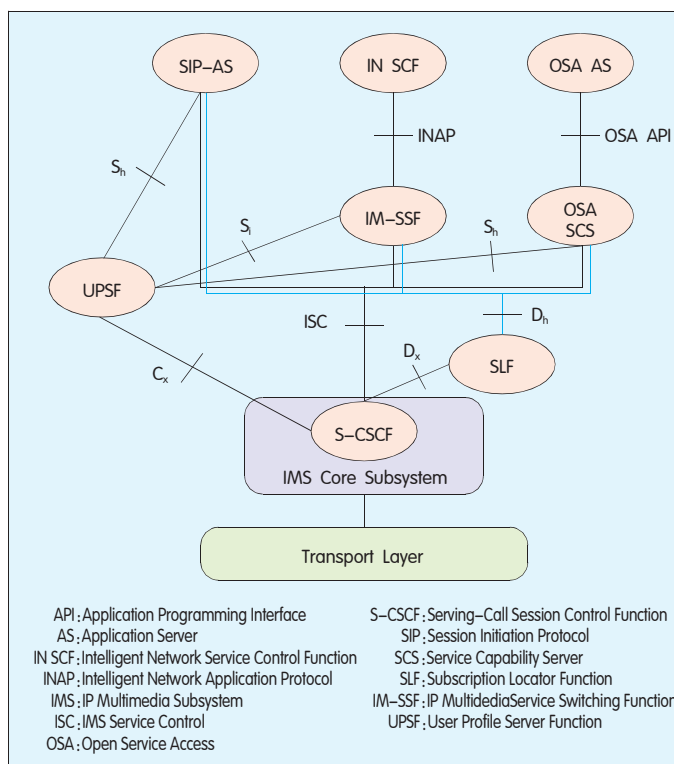


Figure 3. Service provision mode of the next generation network.

full play to their advantages to provide various differentiated and competitive services/applications. The content providers provide more diversified and professional contents for the network and services to further enhance customer service, while the service agents and service wholesalers provide clear channels for selling services. Just because of the continuous emergence of a variety of new roles, the traditional industrial value chain continuously extends in vertical direction for emerging of more main entities. Meanwhile it deepens horizontally, making cooperation based on division increasingly important. The whole industrial chain evolves gradually to a value network ecosystem^[5].

In this network, the roles are interacting with each other in dynamic motion. With the development of the market and the technology, the roles will continuously change their cooperation mode to place them in the optimum position. They support each other and each role gets its own share to maintain the balance of the entire value network, boost the telecommunication industry and drive the development of related industries such as information, consumables, entertainment, and more.

By now, there are six telecommunication carriers and 13 000 value-added telecommunication service providers in China, to compete with each other. In the future, increasing number of service providers will spread all over the communication network to provide various applications and diversified contents via open interfaces. Subscribers can choose their desired services freely from various service providers and settle accounts together, just as purchasing commodities in a supermarket. In this scenario, the network provider provides the site of the supermarket, while the service provider provides various types of products.

The cooperation relationship between various elements in the ecosystem will become more complicated and closer. Of course, the integrity of the whole system, and the cooperation relationship and contribution of each element are still under progression perfection. The service focus will move upward, and the network operator will no longer dominate

the situation, while contents and applications will hold an increasingly important position.

The government will regulate upstream providers loosely, while downstream providers will be regulated more strictly.

2.2 Multiple Service Provision Modes are Coexisting

The NGN will persist in an operable and manageable service provision mode, and incorporate the beneficial and advanced IP technologies to allow the coexistence of multiple service provision modes. By building up a promising and healthy network, the NGN will be more secure, orderly and efficient.

The telecommunication network has developed over 100 years and formed a complete set of management rules, which are very suitable for public services. The NGN is different from the Internet. It will persist in the operable and manageable operation mode of the existing telecommunication network. At the same time it incorporates the beneficial and advanced IP technologies, to meet the requirements of authentication, accounting— security, and Quality of Service (QoS).

Based on different service categories, network operators will offer a variety of service provision modes, such as fully closed, semi-open, and fully open modes.

- The provision mode that fully closed to outside will still exists.
- The network operator will only provide a channel for some services, and the specific services and applications will be completely handed over to the upstream service, application and content providers.
- For some other services, the network operator provides the network and the connection, the services and applications will be provided by authorized partners to form a controllable service layer and semi-open service network environment.

These three modes will coexist for quite a long period, but the proportion of services provided in each mode will vary. That is, the fully closed mode will be long-standing but with a relatively small proportion, while the proportions of semi-open and fully open modes will

gradually increase, with increasingly diversified service categories.

No matter which service provision mode is employed, the network must be controllable, secure and orderly, without spam information. All information is useful and customized based on user requirements. Users can conveniently acquire mass information without feeling time delay due to the broadband network.

2.3 The Trend of Terminals Multimedia, Intelligentized and Networking is Obvious

It is obvious that terminals are developing toward multimedia, intelligent, and networking, therefore, they will be also involved in service providing and act as the starting point for convergence to drive the development of the industry.

As seen from the existing market requirements, the sales volume of camera phones is higher than that of digital cameras, and the sales volume of MP3 phones exceeds that of MP3 terminals. The communication terminals will incorporate various functions required by people's daily work and life, and integrate various information of traditional media, such as newspaper, broadcast, TV, and more. They will appear in every aspect of people's work and life to shape an industry chain and drive the development of the industry. The same terminal may be connected to a network through different access technologies, and provides converging operating system functions and user interfaces. It supports flexible expansion and unified open interface, is programmable and can dynamically load applications to ensure easy portability, fast development, and loading of new services. Terminals have powerful multi-task concurrent processing capability to guarantee a pleasant service experience for users.

In addition to the integration and enhancement of functions for an individual terminal, a tendency towards network application among different terminals is becoming obvious. The home networking technology will connect communication, consumable and entertainment terminals together to build up a powerful broadband home network,

and provide users with diversified services and applications such as voice, data, video, entertainment, work, learning, and life.

2.4 User Requirements is Individualizing and Diversifying

The service provision mode will extend from the core to the edge and from the network to the user. User requirements will be customized and users will be more extensively involved in the service providing process. User requirements will be individualized and diversified and the service provision becomes more "people-oriented".

Presently, Internet services such as Google and bloc have such features as individualization and self-organized information sharing, therefore, the rapid development of the Internet impacts the service provision mode and service strategy of NGN. With terminals becoming more intelligent and service providing interfaces more open, users will be more extensively involved in service providing to break through the

closed service provision mode of the traditional telecommunication network. Under the precondition of guarantee security, each user can be involved in service providing just as the Internet, to develop his own services and provide service for other users while enjoying services. At the same time, the consumption custom of each user on the communication network will become an identification of the user on the communication network just as the fingerprint. The network can tailor more diversified and high-quality individualized services for users based on the consumption custom of the user as well as the time, location and environment.

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Biography



Zhang Xueli graduated from Beijing University of Posts and Telecommunications. She is the vice director of the Network and Switching Research Department of the Institute of Communications Standard Research, Ministry of Information Industry (MII) of China. She is the deputy chief of the Service and Application Work Group of the Network and

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ZTE Launches the World's Smallest RRU at 3GSM World Congress 2007

Roundup

ZTE Corporation, a leading global provider of telecommunications equipment and network solutions, launched what it believes is the world's smallest micro base station—the ZXWR R8840 at the 3GSM World Congress 2007. The Remote Radio Unit (RRU), just 19 litres in volume and 17 kilogrammes in weight, is a fibre fed, compact Wideband Code Division Multiple Access (WCDMA) radio which extends the coverage range of Universal Mobile Telecommunications System (UMTS) base stations.

"The world of cellular telecommunications is undergoing a fundamental transformation. Operators are offering cheaper calls in the home by marrying new in-home micro base stations with the subscriber's own broadband for backhaul," said Fang Hui, General Manager of ZTE's WCDMA Product Range. "As 3G enjoys increased uptake, operators are looking to plug the gaps in their coverage with performance-boosting radio solutions, and deliver on promised network speeds."

The ZXWR R8840 is a RRU product designed as part of ZTE's WCDMA Operations and Maintenance (O&M) plant operations and management solution, used together with

Baseband Unit (BBU) and base station products. The ZXWR R8840 saves considerable equipment space for operators. It unites the micro base station's small size and the macro base station's powerful coverage capability, helping meet operators' requirements in both densely populated and more typical urban areas. Its low power consumption considerably decreases the operator's Operating Expenditure (OPEX). Moreover, it can support multiple frequencies and its maximum capacity of four carriers enables simple network upgrades in the future.

ZTE also announced the development of a smaller Home NodeB product at the 3GSM exhibition. This system, being developed together with Samsung Electronics, will allow mobile operators to take advantage of fixed-line broadband networks to relieve their cellular backhaul networks, improve indoor coverage and offer cheaper in-house calling tariffs. By the time the NodeB product is put into commercial use in the second half of 2007, ZTE's new generation base station family, including its micro base station, macro base station, RRU, and Home NodeB will enable operators to provide seamless coverage under all circumstances. (ZTE)